TECHNICAL REVIEW DOCUMENT
for
MINOR MODIFICATION
of
OPERATING PERMIT 95OPPR069
issued to:

City of Lamar
Lamar Light and Power
Prowers County
Source ID 0990006

Prepared on September 11, 2001
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I. Purpose

This document will establish the basis for decisions made regarding the Applicable Requirements, Emission Factors, Monitoring Plan and Compliance Status of Emission Units covered by this Minor Modification of the Operating Permit proposed for this Site. It is designed for reference during review of the proposed modification by the EPA and any other interested parties. The conclusions made in this report are based on information used in preparing the previous Title V permit, the modification application submitted August 3, 2001, and correspondence with Lamar Light & Power, as well as information from Division files. This narrative is intended only as an adjunct for the reviewer and has no legal standing.

Any revisions made to the underlying construction permits associated with this facility made in conjunction with the processing of this operating permit application have been reviewed in accordance with the requirements of Regulation No. 3, Part B, Construction Permits, and have been found to meet all applicable substantive and procedural requirements. This operating permit incorporates and shall be considered to be a combined construction/operating permit for any such revision, and the permittee shall be allowed to operate under the revised conditions upon issuance of this operating permit without applying for a revision to this permit or for an additional or revised Construction Permit.

II. Source Description

This facility generates electricity for primary, emergency, and peaking use and is classified under the Standard Industrial Classification code 4911. The facility consists of a natural gas burning 25 MW boiler/turbine/generator set, two backup diesel engine/generator sets, and a natural gas fired combustion turbine recently placed in service and the subject of this minor modification. Three unused boilers and associated turbines are located near the backup generators. A 500,000 gallon above ground storage tank stores the diesel fuel for the backup generators.

Construction Permit 99PR0049 was issued July 13, 1999, for a natural gas fired Solar Turbines Mercury 50 regenerative turbine/generator set rated at 4.0 MW. The turbine is owned by the Arkansas River Power Authority, operated by Lamar Light and Power and Solar Turbines is responsible for the turbine repairs or modifications. The Mercury 50 is a prototype unit based on "Ultra-Lean-Premixed Combustion". The design incorporates eight ultra-lean-premixed injectors, a backside cooled annular combustor liner, and a closed-loop carbon monoxide feedback control to achieve consistent emissions across the operating range. There were extended delays in constructing and installing the unit. The turbine started operation on February 2, 2001, but was not placed in sustained operation. The turbine did operate for a two-week period while the boiler was out of service for routine maintenance. The turbine was placed in sustained operation in July in order to accomplish the performance test required by the Construction Permit. The compliance test was completed on July 20 and the turbine engine shut down on July 24 due to a bearing failure after 600 hours of commercial operation. Construction Permit 99PR0049 contained no provisions for a replacement of the turbine engine. Lamar Light and Power was concerned that additional turbine repairs or replacements might be needed in the future as the prototype problems were identified or improvements developed. On August 3, 2001, Lamar Light and Power submitted an application to modify the Title V permit to incorporate the applicable requirements of the Construction Permit for the turbine and to include an Alternative Operating Scenario (AOS) to address future turbine replacements that might be necessary. The AOS will allow the turbine or turbine engine to be replaced when necessary without obtaining a new construction permit or re-opening the Title V Operating Permit. Regulation No. 3, Part C, Section X.I allows a source to make the changes proposed in its application for a minor permit modification immediately after it files the application. On August 8, 2001, a new turbine engine was installed following the provisions of the AOS. On August 29 this replacement engine failed after 500 hours of commercial operation.

The facility is located at 100 North Second Street in Lamar, Prowers County, Colorado. The State of Kansas is designated as an affected state located within 50 miles of the plant. The area in which the plant operates is designated as non-attainment for Particulate Matter under 10 microns (PM_{10}). There are no Federal Class I designated areas within 100 kilometers of the plant. All the sources, except the turbine/generator set, were constructed prior to the creation of the Prevention of Significant Deterioration/New Source Review (PSD/NSR) regulations on December 5, 1974, and the adoption of the current regulation on August 7, 1980. The existing boiler satisfies the criteria for identification as one of the New Source Review/Prevention of Significant Deterioration (NSR/PSD) special category of sources (fossil fuel-fired steam electric plants of more than 250 MMBtu/hr heat input) subject to a major source threshold of 100 tons per year for a regulated pollutant. This facility is, therefore, a major PSD source for nitrogen oxide and carbon monoxide emissions. The emission increases from the addition of the turbine/generator set were below the PSD significance level and did not trigger additional PSD review.

Potential emissions are based upon 8760 hours/year of operation at maximum capacity and a natural gas heating value of 1040 Btu per standard cubic foot of natural gas or Federally enforceable permit limits.

Actual emissions are taken from the Division inventory data base and are based upon the last Air Pollution Emission Notice (APEN) received by the Division (2000 data year).

The following table provides the current facility-wide emissions. The Potential to Emit values are the maximum allowable emissions for the current facility. The actual emissions are those reported for Data Year 2000.

	POTENTIAL TO EMIT, Tons Per Year					
	PM	**PM_{10}**	**SO_2**	**NO_x**	**VOC**	**CO**
Unit 6 318 MMBtu/Hr Boiler - NG	11.14	11.14	0.88	806	8.06	123
Unit 7 36 MMBtu/Hr NG Fired Turbine	6.61	6.61	7.41	15.64	1.90	19.03
Unit 46 Worthington 1530 HP Diesel Engine/Generator @ 100 hrs/yr	0.17	0.17	0.16	2.37	0.19	0.51
Unit 49 Fairbanks/Morse 1800 HP Diesel Engine/Generator @ 100 hrs/yr	0.20	0.20	0.19	2.79	0.22	0.60
TOTALS	18.1	18.1	8..6	827	10.4	143
ACTUAL EMISSIONS 2000 DATA YEAR						
	8.2	8.2	7.7	316.9	2.70	40.9

Shaded values NOT used in PTE Totals

III. SOURCES

S003 Century 50 Combustion Turbine

The applicable requirements from the Construction Permit for this source are being incorporated into this Operating Permit by this minor modification.

1. Applicable Requirements - Construction Permit 99PR0049 was issued for the turbine/generator unit. The compliance test required by the Construction Permit was delayed until July 2001. The compliance test identified compliance with the permit requirements.

The turbine is subject to the particulate standard for fuel burning equipment as stated in Colorado Regulation No. 6, Part B, Section II.C.2. The regulation requires compliance with a particulate matter emission limit (PE) of 0.20 pounds per million Btu at the turbine design heat input rate, based on the following equation:

$PE = 0.5(FI)^{-0.26}$ where FI = Fuel Input in Million Btu per Hour and
PE = Particulate Emissions in pounds per million Btu.

Colorado Regulation No. 6, Part B, Section II.D.3.a. sets a limit of 0.8 pounds of sulfur dioxide per million Btu of heating input.

Additionally, the turbine must meet the opacity standards set by Colorado Regulation No. 1, Section II.

The existing boiler satisfies the criteria for identification as one of the New Source Review/Prevention of Significant Deterioration (NSR/PSD) special category of sources (fossil fuel-fired steam electric plants of more than 250 MMBtu/hr heat input) subject to a major source threshold of 100 tons per year for a regulated pollutant. This facility is, therefore, a major PSD source for nitrogen oxide and carbon monoxide emissions. The area in which the plant operates is designated as non-attainment for Particulate Matter under 10 microns (PM_{10}).

The turbine/generator set has a New Unit Exemption from the Acid Rain provisions as long as the average annual sulfur content of the natural gas being burned remains below 0.05% by weight.

The turbine is subject to the provisions of the New Source Performance Standards (NSPS), Subpart GG, "Standards of Performance for Stationary Gas Turbines". Subpart GG §60.332(l) exempts a regenerative turbine with a heat input of less than 100 million Btu per hour from a short term limit (ppm) for nitrogen oxides. Subpart GG §60.333 allows compliance with either a sulfur dioxide emission limit or compliance with a maximum limit of 0.8% sulfur in the natural gas. Lamar Light & Power will maintain compliance with the natural gas sulfur limit.

2. Emission Factors - Emissions from the turbine are produced from the combustion of natural gas. The pollutants of interest are Nitrogen Oxides (NOx), Sulfur Dioxide ($SO_{2)}$, Carbon Monoxide (CO), Volatile Organic Compounds (VOC), Particulate Matter (PM), and a subset of PM, Particulate Matter under 10

microns (PM_{10}). Small quantities of Hazardous Air Pollutants (HAPs) are also emitted due to incomplete combustion. The relative quantities of each pollutant are dependant upon the fuel burned. The main pollutants of concern from natural gas combustion are NOx and CO.

Lamar L&P requested to use a mixture of EPA AP-42 approved emission factors, and emission factors provided by the turbine manufacturer. If the manufacturer emission factors values are greater than the AP-42 emission factors, the Division accepts the use of the factor without the need for validation. If the emission factors values are less than the AP-42 emission factors, the Division requires a compliance test to demonstrate compliance with the permit limits.

Pollutants	AP-42 Emission Factor lb/MMBtu	Manufacturer Emission Factor lb/MMBtu
NOx	0.099	0.0992
VOC	0.0021	0.012075
CO	0.015	0.1207
SO_2	0.94S (0.0470)	
PM	0.0419	
PM_{10}	0.0419	

Shaded values represent emission factors not being used

The AP-42 emission factor for sulfur dioxide is 0.94S where "S" is the weight percent sulfur in the natural gas. The Acid Rain exemption for the turbine requires the natural gas being burned have a sulfur content of less than 0.05%. However, Lamar L&P expects the natural gas sulfur content to be nearly negligible. The sulfur dioxide emission factor becomes 0.94 X 0.05 = 0.0470 pounds per million Btu for a worst case scenario.

The AP-42 emission factor for particulate emissions has been updated to 0.0066 pounds per million Btu. However, the Construction Permit and the modeling were done based on the outdated emission factor of 0.0419 pounds per million Btu. The modeling required for the Construction Permit demonstrated acceptable results even with the use of the outdated emission factor. Lamar L&P has requested to continue to use the outdated emission factor which is higher than the AP-42 emission factor. This is a conservative approach acceptable to the Division.

3. Monitoring Plan – The natural gas use is to be measured by a gas metering system. The computer system for the turbines records the fuel use rate hourly and serves as a backup system for the metering.

The turbine design identifies the current EPA AP-42 particulate matter emission factor as 0.0419 pounds per million Btu. Since the emission factor (0.0419) and the short term emission standard (0.20) are expressed in the same units of measure, and the emission factor is much smaller than the emission standard, the turbine design assures the 0.20 pounds per million Btu limit set by Colorado Regulation No. 6 will never

be exceeded when burning natural gas unless there is other credible evidence to the contrary. A similar argument may be made for compliance with the Colorado Regulation No. 6 short term sulfur dioxide limit. It is noted that the gas wells supplying the boiler and the turbine are owned by Lamar Light & Power. The NSPS Subpart GG provisions require monitoring of the fuel nitrogen and sulfur content. A letter from EPA to Lamar L&P, dated December 21, 1999, exempted the turbine from the requirement to monitor the fuel nitrogen content as long as pipeline quality natural gas was combusted. In addition, the letter established a natural gas sulfur content monitoring schedule. The letter also approved the use of the Gas Processors Association Standard 2377-86 Length of Stain test for measuring the gas sulfur content. A Division approved fuel sampling/testing plan will be followed to demonstrate compliance with the natural gas sulfur content. The sulfur dioxide sampling/testing frequency will follow the schedule previously approved in writing by EPA. The lack of sustained operation of the turbine engine has delayed the implementation of the fuel sampling program. There is no purpose in sampling the gas if the turbine is not operating.

Compliance with the annual limits will be demonstrated by the calculation of the emissions from the gas consumption and the emission factors identified in the table above.

The Division has determined, based upon AP-42 emission factors and engineering judgment, that visible emissions from the turbine when burning natural gas will be insignificant. Therefore, unless other credible evidence is presented, the turbine emissions will be considered to be in compliance with the opacity standard as long as pipeline quality natural gas is the only fuel combusted.

The delay in placing the combustion turbine on line has disrupted the schedule for performing the sulfur tests. Lamar L&P will initiate the sulfur testing schedule once the combustion turbine is placed in service for an extended time. A Standard Operating Procedure for sampling and testing the natural gas sulfur content was submitted with the renewal application. Therefore, all the elements are in place for conducting the testing once the combustion turbine is placed in service for an extended time.

4. Compliance Status – Lamar Light & Power certified compliance with all the applicable requirements at the time of the submittal of the minor modification application. Based upon the information provided and inspections of the equipment covered in the application, this facility is considered to be in compliance with all applicable requirements.

IV. ALTERNATE OPERATING SCENARIOS

Lamar L&P requested the modification of this Operating Permit provide an Alternate Operating Scenario to allow efficiency change out or replacement of the turbine or turbine engine as be necessary to deal with design problems encountered in the future. The AOS is intended to avoid repeated openings of the Operating Permit for replacement of the engine.

V. MISCELLANEOUS

The Title V permit has been modified to reflect the standardized format now currently in use by the Division, and wording approved by EPA.

As noted in the Technical Review Document for the previous Operating Permit the Division believed the Operating Permits would be improved if the potential-to-emit (PTE) values were shown in the permit for grandfathered sources. The PTE of a grandfathered source is set by the design capacity, and the values represent an operating limit, not a regulatory limit. The inclusion of these values provides the permit reviewer with a perspective of the maximum emissions for a source.

From time to time published emission factors are changed based on new or improved data as demonstrated by the change in emission factors for the renewal permit. A logical concern is what happens if the use of the new emission factor in a calculation results in a source being out of compliance with a permit limit. For this Operating Permit, the emission factors or emission factor equations included in the permit are fixed until changed by a modification of the permit. Obviously, factors dependent on the fuel sulfur content or heat content cannot be fixed and will vary with the test results. The formula for determining the emission factors is, however, fixed. It is the responsibility of the permittee to be aware of changes in the factors, and to notify the Division in writing of impacts on the permit requirements when there is a change in factors. Upon notification, the Division will work with the permittee to address the situation.